

Dividing Fractions and Mixed Numbers - Blue Problems

Green Level Word Problems for Reinforcement

1. Counselor Pearl has $12\frac{3}{4}$ feet of string to be shared equally by her campers. Each camper will receive $2\frac{1}{8}$ feet of string. How many campers are in Pearl's group?
2. Norton Novel bought $20\frac{5}{8}$ feet of wood to build a bookcase of five shelves. If each shelf requires the same amount of wood and all the wood is to be used, how long will each shelf be?
3. Antonio is baking bread but does not have a bowl large enough for the amount of dough he wants. He is going to divide the recipe into 3 bowls. Determine how much of each ingredient should go into each bowl.

$8\frac{1}{2}$ cups flour

$1\frac{1}{2}$ tablespoons salt

4 tablespoons dry yeast

$2\frac{1}{4}$ cups warm water

$\frac{1}{2}$ cup oil

4. Pedro has borrowed Antonio's bread recipe, but the only measuring cup he has is a $\frac{1}{2}$ cup measure. Determine how many times he will have to fill it up to measure the following ingredients.

a. $8\frac{1}{2}$ cups flour

b. $\frac{1}{2}$ cup oil

c. $2\frac{1}{4}$ cups warm water

5. Selena is helping Pedro with the bread but she has only a $\frac{3}{4}$ tablespoon measuring spoon. How many spoonfuls will she need to measure each of the following?

a. $1\frac{1}{2}$ tablespoons salt

b. 6 tablespoons sugar

c. 4 tablespoons dry yeast

6. Mei-Ling is building a bookcase. She has a 12-foot long board which she needs to cut into shelves that measure $2\frac{1}{4}$ feet long. How many shelves can she make out of the board?
7. Dontaye wants to put six new speakers into his car. It takes at least $3\frac{1}{2}$ feet of speaker wire to connect each speaker to his car stereo. He has 20 feet of speaker wire. Can he hook up all 6 speakers? Explain your answer.

Blue Level Problems

Evaluate the expression.

8. $\frac{8}{3} \div \left(\frac{4}{5} + \frac{2}{3} \right)$

9. $5\frac{3}{4} \div \left(3\frac{1}{2} - \frac{5}{9} \right)$

10. $\frac{5}{6} \div 4\frac{2}{7} + 3\frac{1}{9}$

11. $\frac{4}{9} \div \frac{24}{27} + \frac{14}{15} \div \frac{7}{3}$

12. $3\frac{1}{2} \div \frac{5}{8} - \frac{3}{8} \div 1\frac{3}{4}$

13. $5\frac{2}{3} \div \frac{9}{10} + \frac{4}{9}$

14. $\frac{3x}{8} \div \frac{15}{16}$

15. $\frac{3m^2}{14} \div \frac{18}{7}$

16. $\frac{10x^2}{13y} \div \frac{15}{26}$

17. Solve the equation $\frac{5}{12}x = 9$.

MULTIPLYING AND DIVIDING RATIONAL ALGEBRAIC EXPRESSIONS

Objective

Given two rational expressions, multiply them or divide them, and simplify the answer.

Cover the answers as you work these examples.

Example

Given $\frac{12x}{15}$ and $\frac{20x}{18}$

Think These Reasons

a. $\frac{12x}{15} \bullet \frac{20x}{18}$

Multiply the given expressions.

$$\frac{12 \bullet 20x^2}{15 \bullet 18}$$

Multiply numerator by numerator and denominator by denominator.

$$= \frac{8x^2}{9}$$

Do the canceling.

b. $\frac{12x}{15} \div \frac{20x}{18}$

Divide the first by the second.

$$= \frac{12x}{15} \bullet \frac{18}{20x}$$

Change dividing to multiplying by the reciprocal.

$$= \frac{12 \bullet 18x}{15 \bullet 20x}$$

Multiply.

$$= \frac{18}{25}$$

Do the canceling.

18. $\frac{6x}{5y} \bullet \frac{10y}{8x}$

19. $\frac{5a}{7b} \div \frac{25a}{21b}$

$$20. \frac{20p}{49s} \cdot \frac{42p}{10s}$$

$$21. \frac{30m}{13t} \div \frac{15t}{52m}$$

$$22. \frac{6ab^2}{35b} \cdot \frac{42a}{18ab}$$

$$23. \frac{3p^2c^3}{5c^6} \div \frac{12p^4c}{10c^2}$$

$$24. \frac{5r}{4s} \cdot \frac{6r}{10s} \cdot \frac{8t}{12t}$$

25. Join Us for a Quarter-pound Burger

Tyron and Tracey were walking home from baseball practice, discussing what perfect weather it was for a cookout. Tyron asked, "Wouldn't it be fun to make quarter-pound burgers just like they sell at fast-food restaurants?"

Tracey agreed that it would be a great idea. They stopped to think what they would need, whom they would invite, and all of the other details needed to plan a cookout.

Since the theme of the party would be, "Join us for a quarter-pound burger!" they spent some time trying to figure out exactly how much ground beef they would need to purchase. Tracey asked, "If we buy 3 pounds of ground beef, how many quarter-pounders can we make?"

Tyron thought a minute, answered, and then said that, for so many people -- a total of 16 guests, including the two of them -- 3 pounds wouldn't be enough. He calculated how much they would need and Tracey agreed with his calculations.

- a. Can you explain what Tyron and Tracey calculated? Why wouldn't 3 pounds be enough to make quarter-pounders for 16 people? Exactly how much would they need to buy?
- b. Depending on the amount of fat in ground beef, cooked burgers can weigh considerably less than uncooked meat. If the cooked burgers lost 17% of their uncooked weight, how much would all of the cooked meat weigh?

For your short **Answer**, use complete sentences to state the amount of ground beef needed as well as the predicted weight of the meat after cooking.

Dividing Fractions and Mixed Numbers - Blue Solutions

Solutions to Green Level Word Problems for Reinforcement

1. Divide the total length of string by the length to be shared equally by each camper.

$$12\frac{3}{4} \div 2\frac{1}{8}$$

Change each mixed number to its equivalent improper fraction. Thus, $12\frac{3}{4} = \frac{51}{4}$ and $2\frac{1}{8} = \frac{17}{8}$.

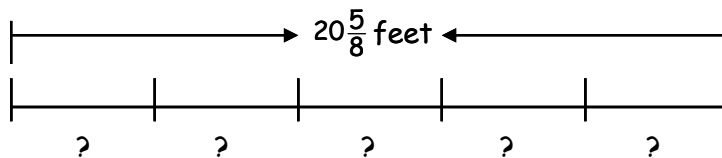
$$12\frac{3}{4} \div 2\frac{1}{8} = \frac{51}{4} \div \frac{17}{8}$$

Change the division to multiplication by using the reciprocal of $\frac{17}{8}$, which is $\frac{8}{17}$.

$$\frac{51}{4} \div \frac{17}{8} = \frac{51}{4} \cdot \frac{8}{17} = \frac{6}{1} = 6$$

There are 6 campers in Pearl's group.

2. Drawing a picture may help you discover the operation needed.



Divide the total length by 5 to find the length of one shelf. Remember, you divide when you know the total (length of the board) and the number of groups (shelves), and wish to find the number in each group (length of a shelf).

$$20\frac{5}{8} \div 5 = \frac{165}{8} \div 5 = \frac{165}{8} \cdot \frac{1}{5} = \frac{33}{8} = 4\frac{1}{8}$$

(Remember that the reciprocal of 5 is $\frac{1}{5}$, and that dividing is the same as multiplying by the reciprocal.) The length of one shelf is $4\frac{1}{8}$ feet.

3. $2\frac{5}{6}$ cups of flour

$\frac{1}{2}$ tablespoon of salt

$1\frac{1}{3}$ tablespoon dry yeast

$\frac{3}{4}$ cup of warm water

$\frac{1}{6}$ cup of oil

4. a. 17 times b. 1 time c. $4\frac{1}{2}$ times
5. a. 2 spoonfuls b. 8 spoonfuls c. $5\frac{1}{3}$ spoonfuls
6. 5 whole shelves plus $\frac{1}{3}$ of another shelf (which is useless, but could possibly be used for something else).
7. No. $3\frac{1}{2} \cdot 6 = 21$ feet of wire that's needed to hook up all 6 speakers. He only has 20 feet of wire.

Solutions to Blue Level Problems

8. $1\frac{9}{11}$
9. $1\frac{101}{106}$
10. $3\frac{11}{36}$
11. $\frac{9}{10}$
12. $5\frac{27}{70}$
13. $6\frac{20}{27}$
14. $\frac{2x}{5}$
15. $\frac{m^2}{12}$
16. $\frac{4x^2}{3y}$
17. $21\frac{3}{5}$

MULTIPLYING AND DIVIDING RATIONAL EXPRESSIONS

18. $\frac{3}{2}$
19. $\frac{3}{5}$

$$20. \frac{12p^2}{7s^2}$$

$$21. \frac{8m^2}{t^2}$$

$$22. \frac{2a}{5}$$

$$23. \frac{1}{2p^2c^2}$$

$$24. \frac{r^2}{2s^2}$$

25. Join Us for a Quarter-pound Burger.

- a. They would need to buy 4 pounds of ground beef for 16 quarter-pound burgers. After cooking it would weigh 3.32 pounds. First I set the proportion for figuring out the amount of the ground beef for 16 people or 16 burgers.

$$\frac{1 \text{ burger}}{\frac{1}{4} \text{ pound}} = \frac{16 \text{ burgers}}{x \text{ pounds}}$$

$$X = 16 \bullet \left(\frac{1}{4} \right)$$

$$X = 4 \text{ pounds}$$

They would need to buy 4 pounds of ground beef for 16 people.

- b. If the cooked meat will lose 17% of its uncooked weight $100\% - 17\% = 83\%$ of the meat will remain after cooking. Again I set the proportion for figuring out 83% of the 4 pounds of ground beef.

$$\frac{4 \text{ pounds}}{100\%} = \frac{x \text{ pounds}}{83\%}$$

$$100 \bullet x = 4 \bullet 83$$

$$X = \frac{332}{100}$$

$$X = 3.32 \text{ pounds}$$

The cooked meat would weigh 3.32 pounds. They would need to buy 4 pounds of ground beef for 16 quarter-pound burgers. After cooking it would weigh 3.32 pounds.